

CLAIM LISTING

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Currently Amended) An electrochemical cell comprising:
 - (a) a cathode comprising an electroactive sulfur-containing material;
 - (b) an anode comprising lithium; and
 - (c) a nonaqueous electrolyte, wherein the electrolyte comprises:
 - (i) one or more nonaqueous solvents selected from the group consisting of acyclic ethers, cyclic ethers, polyethers, and sulfones;
 - (ii) one or more lithium salts; and
 - (iii) one or more N-O additives, wherein the one or more N-O additives comprise an inorganic nitrite selected from one or more of the group consisting of lithium nitrite, potassium nitrite, cesium nitrite, and ammonium nitrite;

wherein the cell exhibits utilization of the electroactive sulfur-containing material of at least 60 % and a charge-discharge efficiency of at least 80 % over at least 10 cycles at a charge rate of about 0.2 mA/cm² and a discharge rate of about 0.4 mA/cm².
2. (Cancelled)
3. (Cancelled)
4. (Original) The cell of claim 1 that exhibits a charge-discharge efficiency of at least 90%.
5. (Original) The cell of claim 1 that exhibits utilization of the electroactive sulfur-containing material of at least 60% over at least 20 cycles at a discharge rate of about 0.4 mA/cm².
6. (Original) The cell of claim 1 that exhibits utilization of the electroactive sulfur-containing material of at least 60% over at least 50 cycles at a discharge rate of about 0.4 mA/cm².

7. (Original) The cell of claim 6 that exhibits a charge-discharge efficiency of at least 90% at a discharge rate of about 0.4 mA/cm².
8. (Currently Amended) The cell of claim [[3]] 1 that exhibits utilization of the electroactive sulfur-containing material of at least 60% over at least 20 cycles at a discharge rate of about 2.8 mA/cm².
9. (Cancelled)
10. (Currently Amended) The cell of claim [[3]] 1 wherein the one or more N-O additives further comprise ~~is selected from~~ one or more of the group consisting of inorganic nitrates, organic nitrates, ~~inorganic nitrites~~, organic nitrites, and organic nitro compounds.
11. (Cancelled)
12. (Cancelled)
13. (Cancelled)
14. (Currently Amended) The cell of claim [[3]] 1 wherein the one or more lithium salts is selected from one or more of the group consisting of LiSCN, LiCF₃SO₃, and LiN(CF₃SO₂)₂.
15. (Currently Amended) The cell of claim [[3]] 24 wherein the electrolyte further consists of the one or more lithium salts consist of LiSCN and or LiN(CF₃SO₂)₂ and the N-O additive comprises lithium nitrate.
16. (Currently Amended) The cell of claim [[2]] 1 wherein the concentration of the one or more N-O additives in the electrolyte is from about 0.02 m to 2.0 m.

17. (Currently Amended) The cell of claim [[2]] 1 wherein the concentration of the one or more N-O additives in the electrolyte is from about 0.1 m to 1.5 m.
18. (Currently Amended) The cell of claim [[2]] 1 wherein the concentration of the one or more N-O additives in the electrolyte is from about 0.2 m to 1.0 m.
19. (Currently Amended) The cell of claim [[2]] 1 wherein the concentration of the one or more lithium salts in the electrolyte is from about 0.2 m to about 2.0 m.
20. (Original) The cell of claim 1 wherein the electroactive sulfur-containing material comprises elemental sulfur.
21. (Original) The cell of claim 1 wherein the anode comprises lithium metal.
22. (Original) The cell of claim 1 that further includes a separator interposed between the anode and the cathode.
23. (Original) A battery comprising a casing and one or more cells of claim 1.
24. (Currently Amended) ~~The cell of claim 2~~ An electrochemical cell comprising:
 - (a) a cathode comprising an electroactive sulfur-containing material;
 - (b) an anode comprising lithium; and
 - (c) a nonaqueous electrolyte, wherein the electrolyte comprises
 - (i) one or more nonaqueous solvents selected from the group consisting of acyclic ethers, cyclic ethers, polyethers, and sulfones; and
 - (ii) one or more N-O additives, wherein the one or more N-O additives is lithium nitrate;wherein the cell exhibits utilization of the electroactive sulfur-containing material of at least 60 % and a charge-discharge efficiency of at least 80 % over at least 10 cycles at a charge rate of about 0.2 mA/cm² and a discharge rate of about 0.4 mA/cm².

25. (Currently Amended) The cell of claim [[2]] 1 wherein the nonaqueous solvent comprises dioxolane.
26. (Currently Amended) The cell of claim [[2]] 1 wherein the one or more solvents consists of dimethoxyethane and dioxolane.
27. (Cancelled)
28. (Currently Amended) The cell of claim [[3]] 1 wherein the one or more lithium salts are selected from one or more of the group consisting of LiSCN, LiBr, LiI, LiClO₄, LiAsF₆, LiSO₃CF₃, LiSO₃CH₃, LiBF₄, LiB(Ph)₄, LiPF₆, LiC(SO₂CF₃)₃, and LiN(SO₂CF₃)₂.
29. (Previously Presented) The cell of claim 25 wherein the nonaqueous solvent comprises greater than 40% by weight dioxolane.
30. (Previously Presented) The cell of claim 26 wherein the nonaqueous solvent comprises greater than 40% by weight dioxolane.
31. (Currently Amended) The cell of claim [[2]] 1 wherein the nonaqueous electrolyte comprises two or more solvents selected from acyclic ethers, glymes and cyclic ethers.
32. (Previously Presented) The cell of claim 31 wherein one of the two or more non aqueous solvents is dioxolane.
33. (Currently Amended) The cell of claim [[2]] 1 wherein the one or more nonaqueous solvents consist of:
- 1,3-dioxolane and dimethoxyethane; or
 - 1,3-dioxolane and diethyleneglycol dimethyl ether; or
 - 1,3-dioxolane and triethyleneglycol dimethyl ether; or
 - 1,3-dioxolane and sulfolane.

34. (Previously Presented) The cell of claim 33 wherein the electrolyte comprises a binary mixture and the weight ratio of the components of the binary mixture are from about 5 to 95 to 95 to 5.
35. (Previously Presented) The cell of claim 33 wherein the non aqueous solvent comprises greater than 40% by weight dioxolane.
36. (New) The cell of claim 24 that exhibits a charge-discharge efficiency of at least 90%.
37. (New) The cell of claim 24 that exhibits utilization of the electroactive sulfur-containing material of at least 60% over at least 20 cycles at a discharge rate of about 0.4 mA/cm^2 .
38. (New) The cell of claim 24 that exhibits utilization of the electroactive sulfur-containing material of at least 60% over at least 50 cycles at a discharge rate of about 0.4 mA/cm^2 .
39. (New) The cell of claim 24 wherein the concentration of the one or more N-O additives in the electrolyte is from about 0.02 m to 2.0 m.
40. (New) The cell of claim 24 wherein the electroactive sulfur-containing material comprises elemental sulfur.
41. (New) The cell of claim 24 wherein the electrolyte further comprises one or more lithium salts, wherein the lithium salts are selected from one or more of the group consisting of LiSCN, LiBr, LiI, LiClO₄, LiAsF₆, LiSO₃CF₃, LiSO₃CH₃, LiBF₄, LiB(Ph)₄, LiPF₆, LiC(SO₂CF₃)₃, and LiN(SO₂CF₃.
42. (New) The cell of claim 41 wherein the concentration of the one or more lithium salts in the electrolyte is from about 0.2 m to about 2.0 m.
43. (New) The cell of claim 24 wherein the nonaqueous electrolyte comprises two or more solvents selected from acyclic ethers, glymes and cyclic ethers.

44. (New) The cell of claim 24 wherein the nonaqueous solvent comprises dioxolane.
45. (New) The cell of claim 44 wherein the non aqueous solvent comprises greater than 40% by weight dioxolane.
46. (New) The cell of claim 24 wherein the one or more nonaqueous solvents consist of:
1,3-dioxolane and dimethoxyethane; or
1,3-dioxolane and diethyleneglycol dimethyl ether; or
1,3-dioxolane and triethyleneglycol dimethyl ether; or
1,3-dioxolane and sulfolane.
46. (New) The cell of claim 45 wherein the electrolyte comprises a binary mixture and the weight ratio of the components of the binary mixture are from about 5 to 95 to 95 to 5.
47. (New) The cell of claim 45 wherein the non aqueous solvent comprises greater than 40% by weight dioxolane.